

# The Intervention of Music Therapy on Adolescent Depression

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**Abstract.** The main purpose of this study is to explore the intervention effect of music therapy on adolescent depression, and to summarize and analyze seven related studies, determine intervention effects and characteristics, identify existing problems, and provide suggestions and directions for further research in the future. In summary, the research results indicate that music therapy can effectively alleviate symptoms of depression in adolescents and can be combined with other treatment methods. However, music therapy still has limitations, as its intervention effect on patients with severe depression is relatively small and time limited (long-term use of music therapy treatment will gradually decrease over time). However, there are still inconsistencies between data in existing studies, and the types and methods of treatment used in reference studies are not uniform. Hence, further investigation is required in the future to establish the most optimal timing, frequency, and form of music therapy treatment.

**Keywords:** Depression; music therapy; adolescent.

## 1. Introduction

Depression is a common mental disorder. It affects approximately 33241 people worldwide [1]. According to the World Health Organisation, depression is the leading cause of disability worldwide [2]. Adolescence is a period of high incidence of depression. In their developmental stage, adolescents face pressures of academic and interpersonal communication. They are more susceptible to depression. According to statistics, the number of adolescents aged 15-19 with depression accounted for 3.38% of the global number of depressions [3]. To address the high incidence of depression in adolescents and the potential limitations of traditional interventions, alternative therapies such as music therapy (MT) have attracted much attention in recent years. MT is a non-drug intervention [4] that systematically that employs music in a structured manner to cater to individual's emotional, cognitive, social, and personal requirements [5]. MT has been shown in previous research to have a moderate or significant effect on improving depression [6, 7]. This therapy is particularly effective for patients who are unable to communicate and cope with language problems [8]. The objective of this article is to examine the impact of current MT interventions on depression in adolescents, and to provide support for intervention time to reduce depression in the future.

## 2. The intervention effect of Music Therapy on adolescent depression

MT is a clinical intervention based on music. It is a therapeutic method that uses music and sound to promote physical, psychological and emotional health. It can help people alleviate emotional problems such as stress, anxiety, depression, etc. by playing, singing, listening to or creating music. MT can be used by people of all ages and backgrounds, and is particularly helpful for those with communication barriers and difficulty understanding speech. MT can be divided into two main types: active and receptive. Active refers to patients/participants who create or interpret music through vocal and instrumental means. Receptive refers to patients/participants who listen to prerecorded music or live music performances. The types of MT used in the research referred to in this article also include self-directed music listening (SDML), group music therapy (GMT) and some personalised MTs based on 'active and receptive'. The aim of MT is to improve health and reduce pain, independent of the therapeutic relationship, and can be considered as music medicine [9]. This article will focus on the intervention effect of MT on adolescent depression and describe its impact.

As shown in Table 1, existing studies have investigated the role of MT in reducing depression in individuals. The majority of studies to date have found positive effects, and MT has a positive and significant effect on adolescents with mild to moderate depression, and no negative effects when combined with conventional treatment. However, for adolescents with severe depression, MT is not very effective in relieving symptoms [10]. In the study by Geipel, J. et al, participants with varying degrees of depression showed a significant decrease in CDRS-R and BDI-II scores after treatment, and 6 participants showed no depression scores. In the three months following MT, there were fluctuations in the participants' scores during the fogging up period, but overall scores still decreased. However, one participant with severe depression maintained a score of severe depression throughout the study period [10].

The type of music can influence the effectiveness of depression interventions. Field, T et al.'s research employed two distinct genres of music (rock and classical), and the findings demonstrated that both types had a beneficial impact on depression in adolescents. The study also suggests that MT may not have a beneficial effect on the music itself, but rather on the music-induced emotions that have a positive effect on adolescent depression. Park, J, et.al. and Chen, C. J. et.al.'s research took into account participants' musical preferences, but did not compare different types of music to explore which type of music is more beneficial for intervening in adolescent depression. The study by Gold C et al has the largest sample size of the studies referenced in this article. He used two methods, self-directed music listening (HTML) and group music therapy (GMT), to treat 100 participants in groups. The results showed that over the three-month study period, participants in GMT and SDL showed improvements in their mental health. This study has demonstrated the attractiveness of using MT as a preventive intervention in schools for students.

**Table 1.** Summary of Selected Research Results on Music Therapy for Depression in Adolescents

Author, Time	Sample size	Sample age	Types of music therapy	Physiology (physiological markers)	Depression Scale
Jong-In Park et.al., 2023	36	7-8- /Children and adolescents	active and receptive	blood and cortisol	CDI
Josephine Geipel et.al. 2022	9	13-17 (15.22)	active and receptive	hair cortisol concentration (HCC)	BDI-II
Chen-Jung Chen et.al., 2019	65	12-13	Modification of personalized music therapy protocol based on Gerdner	/	BDI
Gold C et.al. 2017	67	13-15	Self directed music listening (SDML), Group music therapy (GMT)	/	K10
Sam Porter et.al., 2017	181	8-16	Alvin model of 'Free Improvisation'	/	CES-DC
Hendricks, C et.al. 1999	19	14-15	Hansel and Thompson's MT Strategy	/	BDI
Field, Tiffany et.al. 1998	28	14-19 (16.8)	receptive	electroencephalography (EEG) and salivary cortisol	BDI, DIS

BDI: Beck Depression Inventory, CDI: Children Depression Inventory, CES-DC: Centre for Epidemiological Studies Depression Scale for Children, K10: Kessler 10 depression scale, DIS: Diagnostic Interview Schedule

### 3. The mechanisms of the associations of Music Therapy and adolescent depression

MT can induce psychological changes in individuals, including self-esteem, thereby reducing their level of depression; self-esteem has a significant impact on the level of depression, with a negative correlation between the two [11]. The presence of low self-esteem can increase the likelihood of developing depression. MT can increase self-esteem in the short term and potentially reduce symptoms of depression in this population. According to research by Porter, S, MT can improve

participants' self-esteem and symptoms of depression, but this effect gradually disappears over time, and significant improvements in self-esteem and depression cease by week 26 [12]. Therefore, moderate short-term treatment should be considered when using MT therapy [13] to avoid treatment failure. Although the study by Park, J, et al. focused on adolescent depression patients with ADHD, it is still relevant to this article. The study showed that after MT treatment, participants' CDI depression scores statistically decreased significantly, and for adolescents with ADHD, MT can not only alleviate depressive symptoms, but also improve their music perception and problem-solving skills [14].

In addition, MT can lead to physiological changes in individuals, thereby reducing levels of depression. From a physiological perspective, changes in bodily functions can influence changes in depression levels. Therefore, this article will comprehensively summarize the intervention of MT on adolescent depression through the analysis of four biomarkers: blood, hair, saliva and brain. Serotonin (5-HT) has been found to play a role in regulating impulsive behavior through its interaction with the dopamine system. Additionally, it has been linked to a range of behaviors including inhibition, attention, and impulsivity [15]. Research has shown that the blood levels of 5-HT are lower in patients with depression than in those who are not depressed. The study by Park, J. et. al. analyzed the 5-HT levels of the participants before and after MT treatment, and the results showed that the 5-HT levels in the music group increased, while those in the control group did not increase significantly [14]. Therefore, the use of MT can promote the activation of 5-HT. Thus, regulation of impulsive and inhibitory behaviors can alleviate adolescent depression.

Cortisol serves as a biological indicator of prolonged stress within the body and is a key factor in the development and advancement of depression [16]. Depression disrupts communication and neural production in the brain, leading to the release of cortisol. The previous study demonstrates the relationship between music, stress relief effects and depression intervention at a physiological level by observing changes in concentrations of hair cortisol concentration (HCC) and saliva cortisol [17]. Geipel, J. et.al. used immunoassay to analyse HCC, and their research data showed that the average number of HCC decreased by 2.46 before and after testing, and then increased by 0.77 during the three-month follicular up stage. The changes in HCC followed the changes in depression scores, declining from pre-test to post-test and subsequently rising from post-test to follow-up [10]. In the study by Field, T et al, the mean salivary cortisol value decreased from 1.3 to 0.5 before and after testing, showing a downward trend. The study by Park, J.I. et al. also showed a significant decrease in cortisol levels [14]. The study by Field, T et al. also used electroencephalography (EEG) to monitor the effects of MT on brain activity, and explored how MT may affect depression by influencing brain activity. Previous research has indicated that positive emotions are linked to EEG activation in the left frontal lobe, while negative emotions are linked to EEG activation in the right frontal lobe [18]. This suggests that when depression is alleviated and improved, there is a shift in EEG activity from the right frontal lobe to the left frontal lobe. During the study, 14 adolescents in the music group initially displayed right frontal EEG activation. Following the experiment, 10 adolescents showed a shift to left frontal EEG activation, 3 showed an increase in right frontal EEG activation, and 1 adolescent did not experience any change. The control group did not exhibit any significant changes in their measures [18]. After changing the type of music, the three participants who experienced an increase in right frontal EEG activation were treated again, and the results showed that their EEG scores became symmetrical. However, there was a discrepancy between the participants' pre- and post-test BDI data and their EEG and salivary cortisol data in this study. This may be because the participants had less control over human biomarkers, or because physiological changes are more direct than psychological and emotional changes. Further research is therefore needed to explore the relationship between MT and psychological and physiological changes in adolescent depression, and how to measure and explain these differences more accurately.

#### 4. Discussion

MT as a complementary outpatient treatment aims to help adolescents with depression to improve subjective well-being, emotional regulation and interpersonal relationships. Overall, several studies have shown that MT has a positive and significant effect on adolescents with mild to moderate depression, with moderate short-term treatment having the best effect. However, the following questions remain: The study by Geipel, J. et al. did not include a control group, so it is uncertain whether the research effect is a specific therapeutic effect of MT, which needs further research in the future. Field, T. et al.'s study only had female experimental samples and cannot determine whether there is a gender difference in the experiment. Due to the fact that this field is at a developing stage and there are relatively few related studies, most of the selected studies have small sample sizes [10, 19]. The research referred to in this article used several different MT methods, such as Gold C et al.'s study using SDML and GMT methods, but the problem is that there was no comparison between these two MT methods to explore which one is more effective, and there are certain individual differences. Research has found that HTML is more effective with older participants in adolescents with behavioral and emotional problems [12]. However, some participants may experience stress as a result of group therapy, which may affect treatment outcomes. Therefore, further research is needed to compare the intervention effects of MT on depression in different age groups and the intervention effects of different MT methods on adolescent depression in order to find a more appropriate MT method. Music is known to affect emotions. In the research referred to in this article, most studies have used different types of music or taken into account participants' musical preferences. However, there are few and scattered studies on the different effects of different types of music on adolescent depression in MT. The author suggests that further large sample studies are needed to determine the optimal duration, frequency and type of MT for depression.

#### 5. Conclusion and Prospect

Adolescent depression is a common mental health disorder that affects the lives of millions of adolescents worldwide. This article focuses on the intervention effect of MT on adolescent depression and explores its possible mechanisms and application prospects. Through a literature review, it was found that MT can significantly reduce symptoms of depression in adolescents and improve their overall mental health. In addition, MT can enhance participants' perception of music and promote emotional expression, social skills and self-awareness in adolescents. Research has shown that MT can cause changes in some biomarkers, such as a decreasing trend in cortisol, an increasing trend in 5-HT, and left-right movement in the EEG. Future research should evaluate the effects of different types of MT on these biomarkers and examine their association with reducing symptoms of depression. And, while ensuring the effectiveness and safety of the treatment, explore further mechanisms and effects of MT on depression to make MT more effective for adolescent patients with severe depression. Change the way and type of MT to increase its effective intervention time, and develop personalised and tailored MT treatment courses to meet the needs of different patients. Further research is needed to determine the optimal intervention time, frequency and types of MT for adolescent depression in the future.

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